Unitywater

Serving you today, **investing in tomorrow.**

# Sewage Treatment Plant Performance Report

2018-2019

Cover: Kenilworth Floating wetlands
Inside Front Cover: Redcliffe STP rehabilitation

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# Message from the CEO

At the end of our ninth year of operations, Unitywater's sewage treatment plants achieved a combined compliance result of 99.4%, an excellent result and our highest to date.

The treatment standards expected of our 17 Sewage Treatment Plants (STPs) by regulators and communities are high and we are pleased to have met this standard.

Innovation is one of Unitywater's core values and we continued to apply an innovation focus on our STPs throughout the year. Recently implemented improvements to their monitoring systems and processes has allowed even closer scrutiny of their operations, resulting in improved performance.

At South Caboolture STP, the implementation of an advanced system to improve the aeration of effluent during the treatment process has not only significantly reduced the need for chemicals, it has attracted attention within the water industry.

Throughout the year we continued our major upgrade of Kawana STP. By the end of 2019 we will have commissioned engines powered by methane-rich biogas from a new anaerobic digester to help fuel the plant's operations.

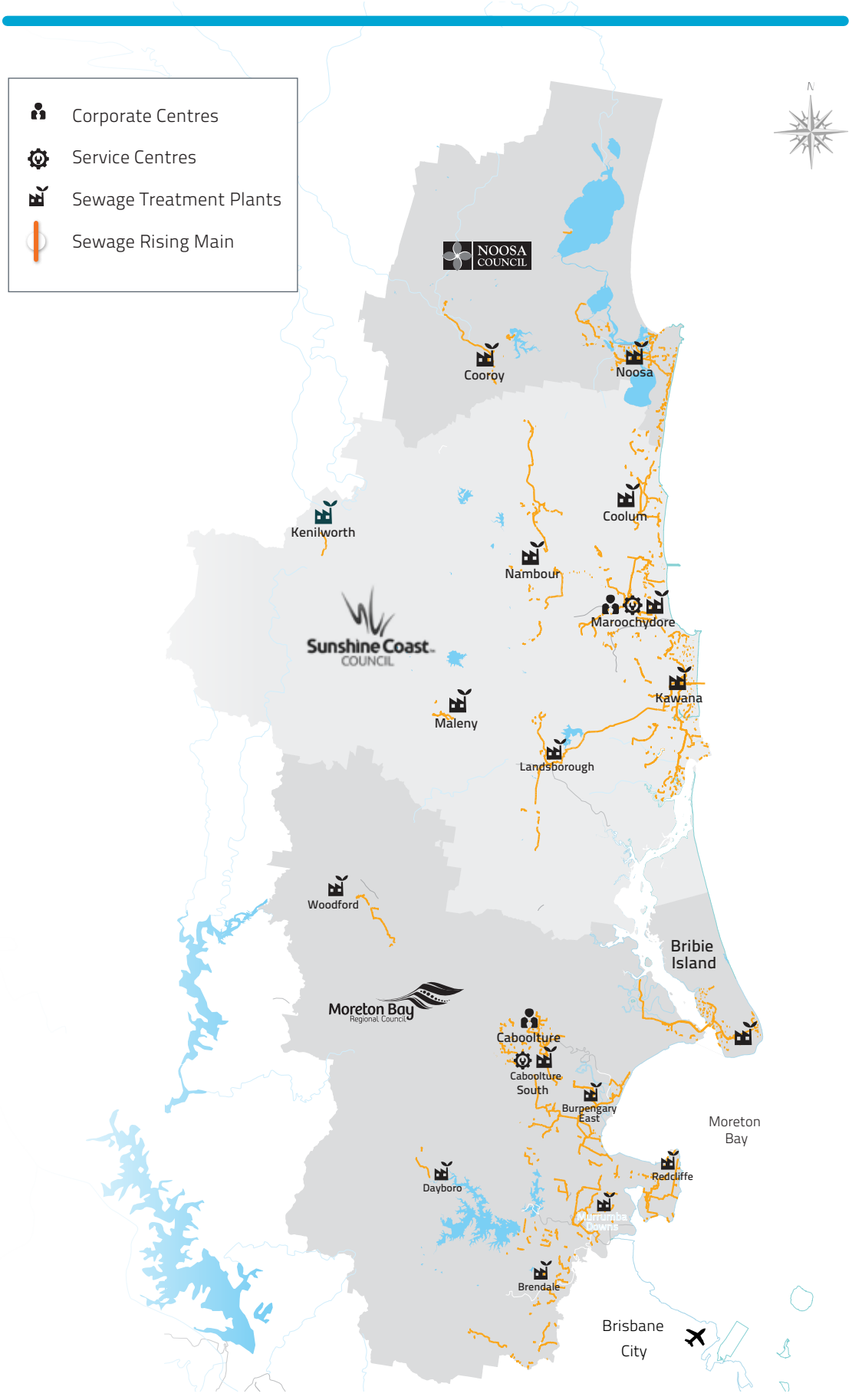
Renewable energy is also being put to work at Kenilworth STP. This smaller plant is now nearly energy-neutral thanks to 12.5 kW solar array, and modular floating wetlands are using the power of nature to improve water quality by taking up nutrients and sediments.

In different ways South Caboolture, Kawana and Kenilworth are starting to deliver on the promise of reduced operational costs made by innovation in treatment processes and renewable energy.

If you have any questions or feedback on the content of this report, please do not hesitate to call our Customer Contact Centre on 1300 086 489.

George Theo
Chief Executive Officer

# Our service area



# 1. Introduction

## Unitywater supplies more than 777,000 people across 5,223 square kilometers with sewerage and water services.

We monitor effluent quality from each sewage treatment plant to assess compliance with conditions specified under the licence granted by the Department of Environment and Science (DES). We hold the following DES registration and approval:

a. A single Registration Certificate, authorising Unitywater to operate sewage treatment plants; and
b. A single Environmental Authority (Environmental Licence) for the following sewage treatment plants:

- Brendale
- Burpengary East
- Bribie Island
- Coolum
- Cooroy
- Dayboro
- Kawana
- Kenilworth
- Landsborough
- Maleny
- Maroochydore
- Murrumba Downs
- Nambour
- Noosa
- Redcliffe
- South Caboolture
- Suncoast (decommissioned)
- Woodford

Should we not meet our obligations as set out in the licence, penalties may apply in accordance with the *Sustainable Planning Act 2009 and Environmental Protection Act 1994*. We report our compliance results each month to the Department of Environment and Science and provide detailed commentary as required to address specific items of note.

This report is published to provide information about effluent quality and some licence compliance statistics from our sewage treatment plants. By meeting licence conditions, we ensure high quality service, minimising impacts on waterways in our local communities.

## 1.1 Quick statistics July 2018 - June 2019

| | |
|---|---|
| Number of sewerage connections | 294,627 |
| Kilometres of sewer main pipes | 5,924 km |
| Number of sewage pump stations | 787 |
| Number of sewage treatment plants | 17 |
| Volume of sewage collected and treated | 56,190 ML[1] |

1. Does not include 1033 ML diverted to Queensland Urban Utilities (QUU) via the Kedron Brook Sewerage Scheme. This sewage would be treated to meet QUU's licence requirements.

## 1.2 Mass load releases

Graphs of mass loads released from sites with load discharge limits to the environment are shown below for information purposes. All treatment plants are within their mass load limits and are licence compliant. The graphs show variability from year to year. Nitrogen and phosphorus mass discharge varies for several reasons, including:

- annual rainfall (wet years result in lower effluent nutrient concentrations due to dilution)
- increasing plant raw sewage loads (as the community grows, effluent nutrient concentrations may gradually increase)
- plant optimisation and improvement activities including "balancing" nitrogen and phosphorus removal with associated power and chemical costs
- the decline in the community's use of phosphate containing detergents.

*Figure 1 – STP with mass licence – total nitrogen*

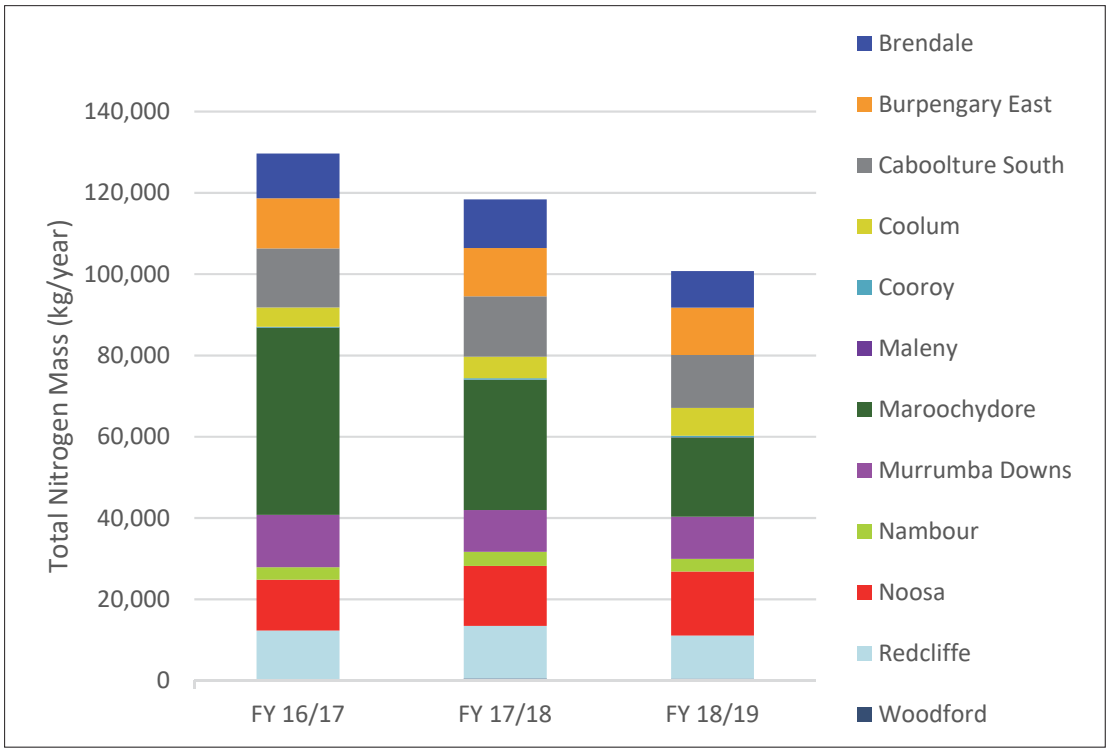
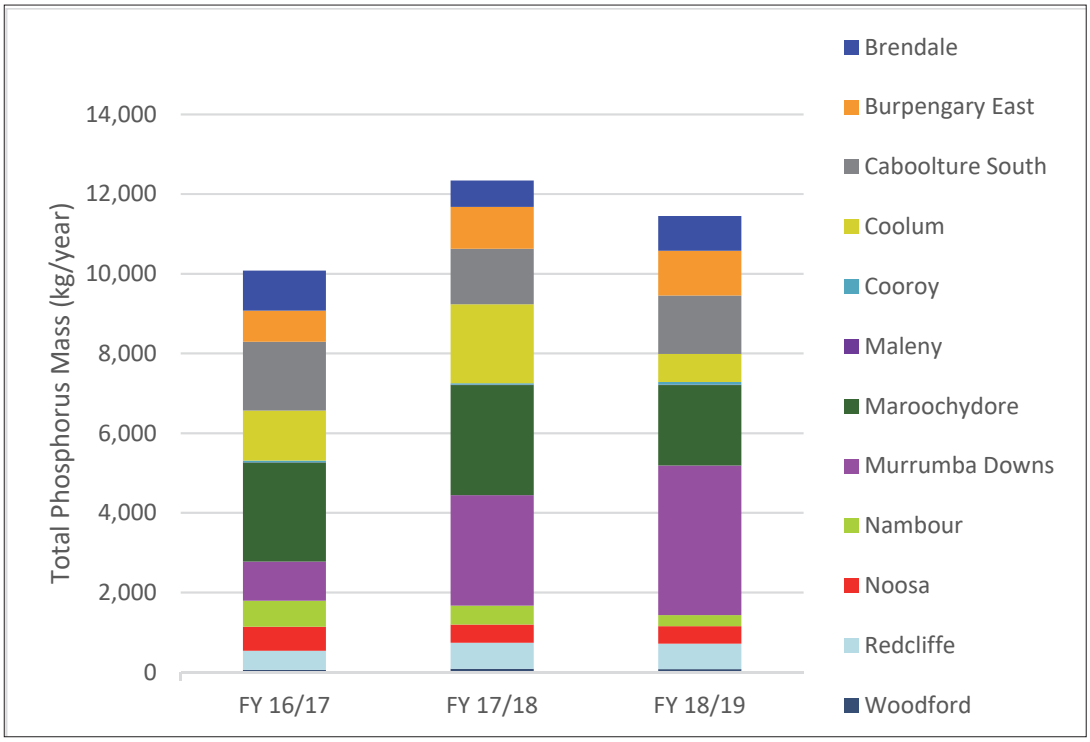


*Figure 2 – STP with mass licence – total phosphorus*




It is worth noting the improvement in effluent quality due to Unitywater's continued investment in improving asset reliability (particularly on the A-recycle pump system) at Maroochydore STP. Murrumba Downs STP's effluent phosphorus concentration has been increasing slightly over the last few years (however remains well within licence limits) as the bioreactor nears its capacity limit. A second bioreactor will come online within the next few years, which is likely to result in reduced phosphorus concentrations.

# 2. Effluent Quality Summary

DES requires that all sewage treatment plants discharge effluent that meets quality and quantity conditions to minimise impacts on the health of waterways in Queensland.

Concentrations of contaminants such as organic matter, suspended solids, chlorine and pathogens are measured and reported. Release volumes and mass loads are also evaluated to compare with limits specified by DES.

In the 2018-19 financial year, Unitywater achieved 99.4% compliance against overall effluent standards discharged from its sewage treatment plants. DES allows fluctuations in effluent quality parameters (DEHP, 2014) and therefore the plants performed within the overall quality standards set by the Environmental Licence. The table below provides a summary of where treated effluent is discharged and overall effluent quality compliance in the 2018-19 financial year.

*Table 1 – Effluent Quality Compliance*

| Sewage Treatment Plant | Catchment Equivalent Population | Treatment Process | Discharge to: | | | Effluent Quality Compliance |
|---|---|---|---|---|---|---|
| | | | Freshwater Body | Ocean | Irrigation, wetlands or groundwater | |
| Brendale | 36,722 | BNR[1] | ✓ | | | 99.8% |
| Bribie Island | 24,617 | Biological nitrogen removal and chemical phosphorus removal | | | ✓ | 98.8% |
| Burpengary East | 50,818 | BNR | ✓ | | | 99.9% |
| Coolum | 27,845 | BNR | ✓ | | | 100% |
| Cooroy | 10,098 | BNR | ✓ | | ✓ | 99.8% |
| Dayboro | 1,026 | Biological nitrogen removal | | | ✓ | 98.3% |
| Kawana | 111,451 | Biological nitrogen removal | ✓ | ✓ | | 99.8% |
| Kenilworth | 390 | Oxidation Pond | ✓ | | ✓ | 97.6% |
| Landsborough[2] | 11,448 | BNR | ✓ | ✓ | | 99.8% |
| Maleny | 2,439 | Biological nitrogen removal and chemical phosphorus removal | ✓ | | ✓ | 100% |
| Maroochydore | 123,835 | BNR | ✓ | | | 97.4% |
| Murrumba Downs | 134,260 | BNR | ✓ | | | 99.8% |
| Nambour | 45,261 | BNR | ✓ | | | 100% |
| Noosa | 47,800 | BNR | ✓ | | | 100% |
| Redcliffe | 61,884 | BNR | | ✓ | | 100% |
| South Caboolture | 63,535 | Biological nitrogen removal and chemical phosphorus removal | ✓ | | | 99.9% |
| Woodford | 2,224 | Biological nitrogen removal and chemical phosphorus removal | ✓ | | | 100% |
| | Overall Compliance | | | | | 99.4% |

Notes: 1. Biological Nutrient Reduction (BNR) – Reduces nitrogen and phosphorus biologically.

2. A separate 'Performance in Detail' table is not provided for Landsborough Sewage Treatment Plant as effluent from this facility is combined with Kawana Sewage Treatment Plant effluent before being released to the outfall.

# 3. Performance in Detail JULY 2018 – JUNE 2019

Note that the release parameters often differ from plant to plant (e.g. Brendale STP has mass load limits and Bribie Island STP does not). This is often due to the nature of the discharge point (e.g. waterway or land) or when the plant was issued DES approval to operate.

## 3.1 Brendale Sewage Treatment Plant

*Table 2 – Brendale STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| $BOD_5$ | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 53 | range | ✓ |
| DO | mg/L | 53 | minimum | ✓ |
| Free Chlorine Residual | mg/L | 53 | maximum | ✓ |
| Faecal Coliforms | cfu/100 mL | 270 | median | ✓ * |
| | | | 80th percentile | ✓ |

* Median faecal coliforms target was exceeded twice in the 2018-19 financial year. Please refer to the next page for further details.

*Table 3 – Brendale STP Mass Limits*

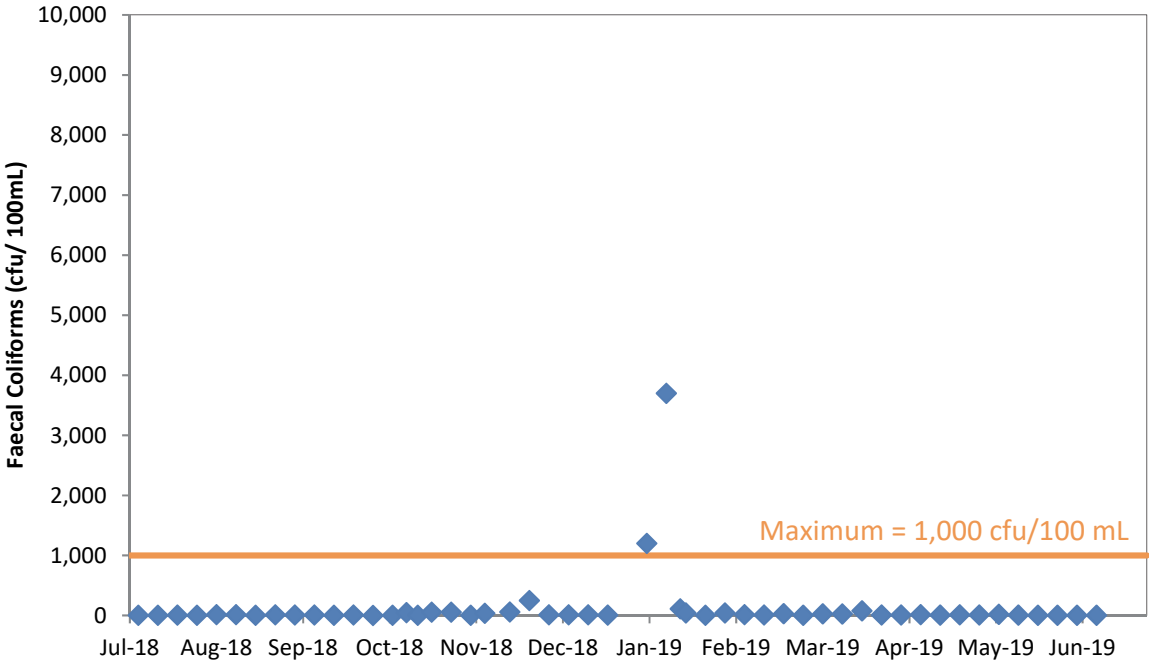
| Parameter | Unit | Number of Days | Limit Type | Compliant |
|---|---|---|---|---|
| Average Annual Flow | ML/yr | 365 | maximum | ✓ |
| Nitrogen Mass Load | kg/yr | - | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | - | maximum | ✓ |

*Exceedances*

## FAECAL COLIFORMS

Target median faecal coliforms were exceeded at Brendale Sewage Treatment Plant in January 2019. A temporary electrical fault occurred with the UV disinfection system that resulted in power being reduced to a proportion of UV lamps. Overall 96% compliance with faecal coliforms limits was achieved in the 2018-19 financial year.

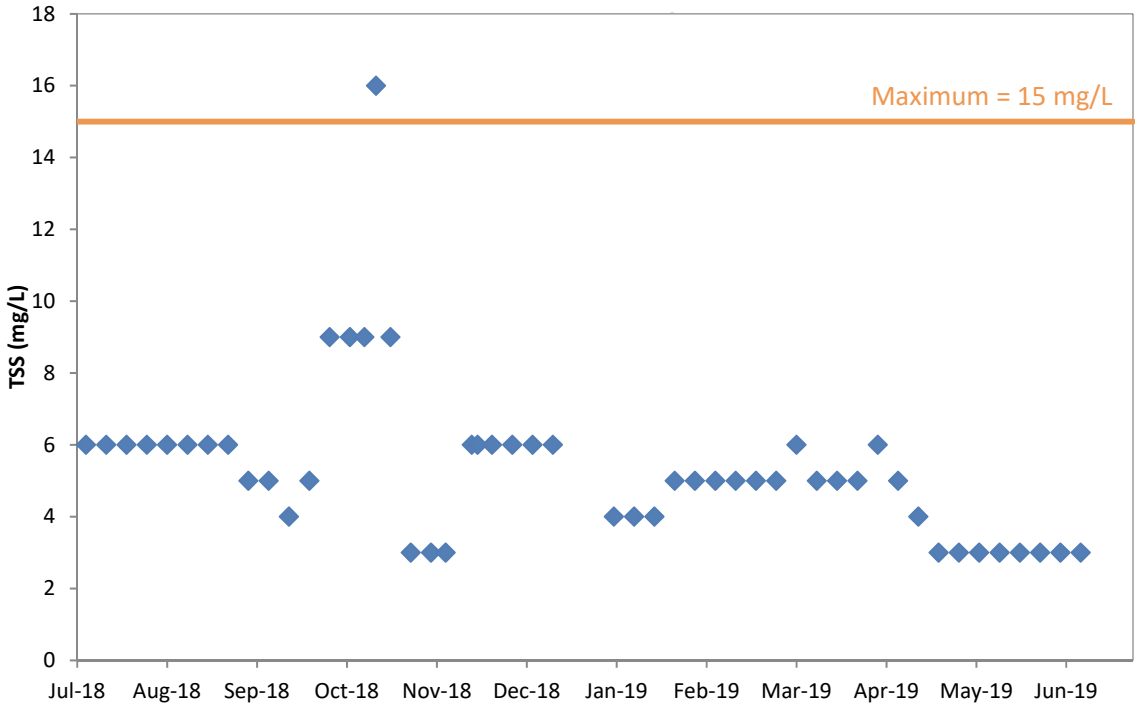
*Figure 3 – Brendale STP – faecal coliforms – median*



## BOD

Target BOD short term 80th percentile was exceeded once at Brendale Sewage Treatment Plant in October 2018. This exceedance occurred during a wet weather event. Overall 98% compliance with 80th percentile BOD limits was achieved in the 2018-19 financial year.

*Figure 4 – Brendale STP – BOD 80th percentile*



## 3.2 Bribie Island Sewage Treatment Plant

*Table 4 – Bribie Island STP contaminant release targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| $BOD_5$ | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓ |
| TN | mg/L | 52 | long term 50th percentile | ✓ |
| | | | short term 50th percentile | ✓ * |
| | | | maximum | ✓ ** |
| TP | mg/L | 52 | long term 50th percentile | ✓ |
| | | | short term 50th percentile | ✓ |
| | | | maximum | ✓ |

* Short term 50th percentile Total Nitrogen was outside of the compliance range eight times in the 2018-19 financial year. Please refer to the next page for further details.

** Maximum total nitrogen was exceeded three times in the 2018-19 financial year. Please refer to the next page for further details.

*Exceedances*

## TOTAL NITROGEN

Maximum total nitrogen was exceeded three times and the short term 50th percentile was exceeded eight times in the 2018-19 financial year at Bribie Island Sewage Treatment Plant. The exceedances in August were caused by maintenance of clarifiers following a sludge transfer system blockage that resulted in a temporary reduction in nitrogen reduction performance. The exceedances in January were due to reduced bioreactor aeration during a period of blower maintenance. Overall 94% compliance in total nitrogen maximum targets and 85% compliance in total nitrogen short term 50th percentile targets was achieved in the 2018-19 financial year.

Bribie Island STP is approaching its design capacity and diffuser replacement and intensification is planned for the 2020-21 which will improve the aeration efficiency and therefore process capacity.

*Figure 5 – Bribie Island STP – total nitrogen – maximum*

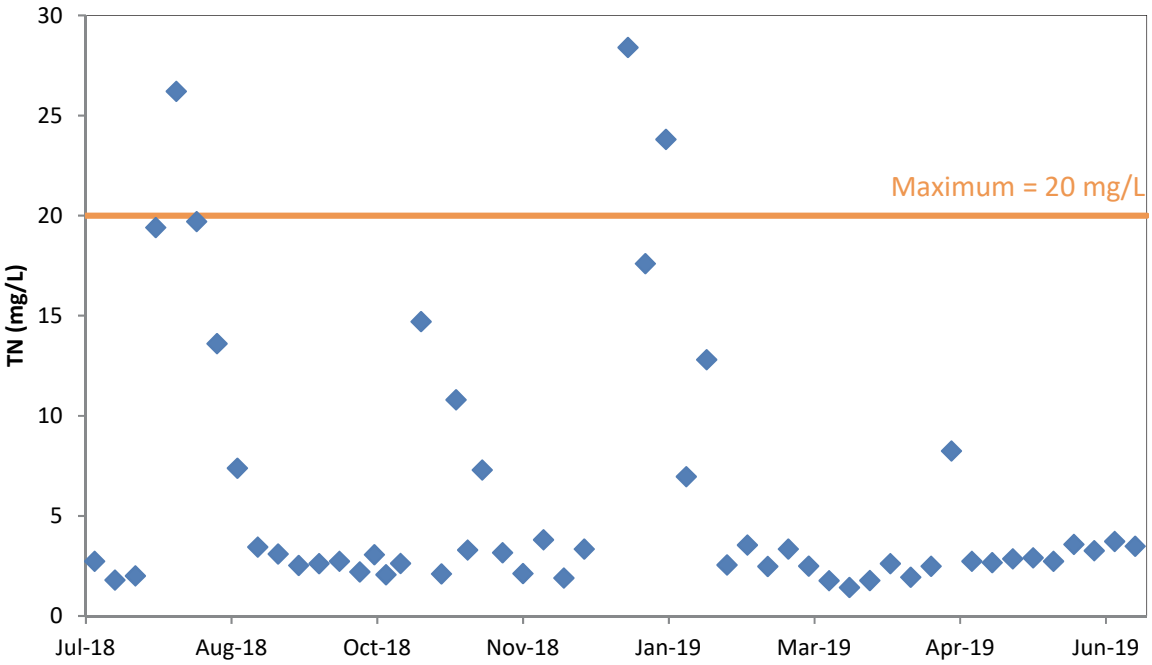
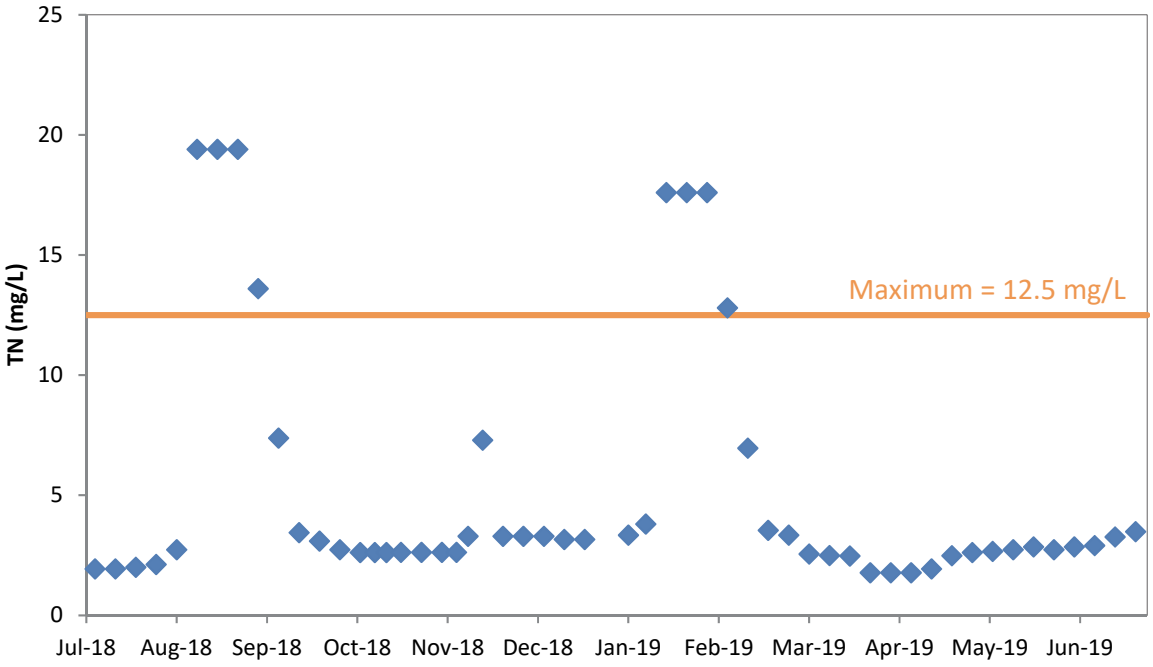


*Figure 6 – Bribie Island STP – total nitrogen – short term 50th percentile*



## 3.3 Burpengary East Sewage Treatment Plant

*Table 5 – Burpengary East STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| $BOD_5$ | mg/L | 51 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 53 | range | ✓ |
| DO | mg/L | 53 | minimum | ✓ |
| Free Chlorine Residual | mg/L | 53 | maximum | ✓ |
| Faecal Coliforms | cfu/100 mL | 265 | median | ✓ |
| | | | 80th percentile | ✓ |

*Table 6 – Burpengary East STP Mass Limits*

| Parameter | Unit | Number of Days | Limit Type | Compliant |
|---|---|---|---|---|
| Average Annual Flow | ML/yr | 365 | maximum | ✓ |
| Nitrogen Mass Load | kg/yr | - | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | - | maximum | ✓ |

## 3.4. Coolum Sewage Treatment Plant

*Table 7 – Coolum STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| $BOD_5$ | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 53 | range | ✓ |
| DO | mg/L | 53 | minimum | ✓ |
| $NH_3$-N | mg/L | 53 | long term 50th percentile | ✓ |
| | | | maximum | ✓ |
| Free Chlorine Residual | mg/L | 53 | maximum | ✓ |
| Faecal Coliforms | cfu/100 mL | 53 | median | ✓ |
| | | | 80th percentile | ✓ |

*Table 8 – Coolum STP Mass Limits*

| Parameter | Unit | Number of Days | Limit Type | Compliant |
|---|---|---|---|---|
| Average Annual Flow | ML/yr | 365 | maximum | ✓ |
| Nitrogen Mass Load | kg/yr | - | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | - | maximum | ✓ |

## 3.5. Cooroy Sewage Treatment Plant

*Table 9 – Cooroy STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| TSS | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 53 | range | ✓ |
| DO | mg/L | 53 | minimum | ✓ |
| TN | mg/L | 53 | long term 50th percentile | ✓ |
| | | | maximum | ✓ |
| TP | mg/L | 53 | long term 50th percentile | ✓ |
| | | | maximum | ✓* |
| Intestinal Enterococci | mg/L | 159 | long term 50th percentile | ✓ |
| | | | maximum | ✓ |

* Maximum total phosphorus was exceeded once in 2018-19. Please refer to further details below.

*Table 10 – Cooroy STP Mass Limits*

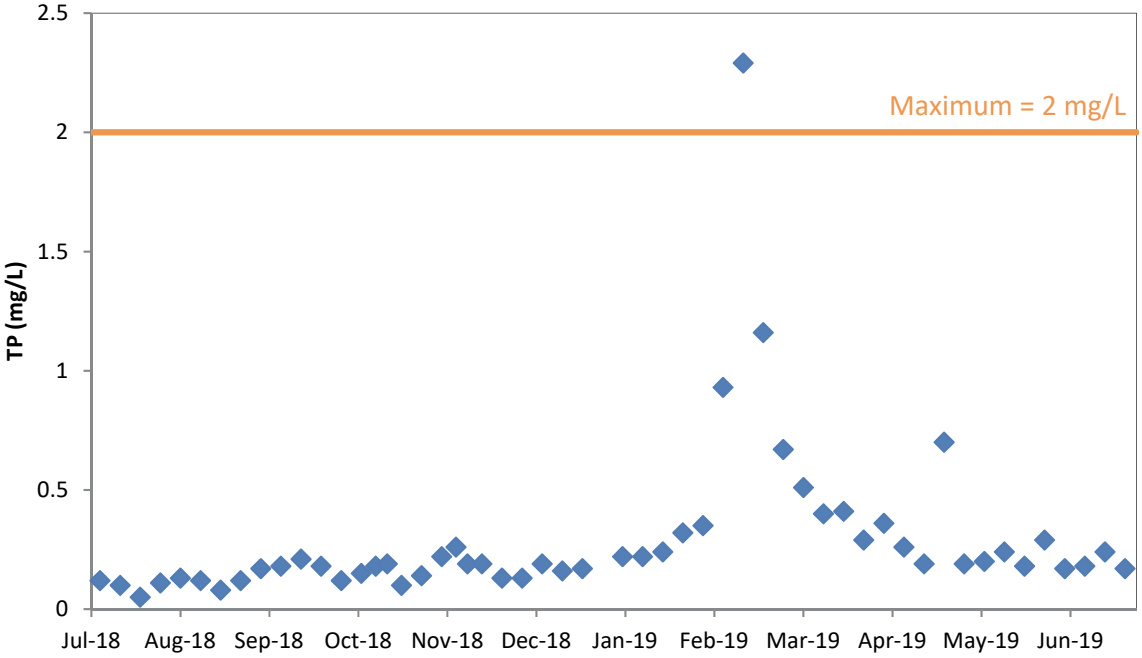
| Parameter | Unit | Limit Type | Compliant |
|---|---|---|---|
| Nitrogen Mass Load | kg/yr | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | maximum | ✓ |

*Exceedances*

## TOTAL PHOSPHORUS

Maximum Total Phosphorus was exceeded one time in the 2018-19 financial year. This exceedance occurred immediately following a wet weather event (62mm in a 24 hour period). 98% compliance was achieved for the maximum limit in the 2018-19 financial year.

*Figure 7 – Cooroy STP – TP – maximum*



## 3.6. Dayboro Sewage Treatment Plant

*Table 11 – Dayboro STP Contaminants Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| $BOD_5$ | mg/L | 12 | 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 12 | 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 12 | range | ✓ |
| $NH_3$-N | mg/L | 12 | 50th percentile | ✓ |
| | | | maximum | ✓* |
| E. Coli | mg/L | 65 | median | ✗** |
| | | | 80th percentile | ✓*** |

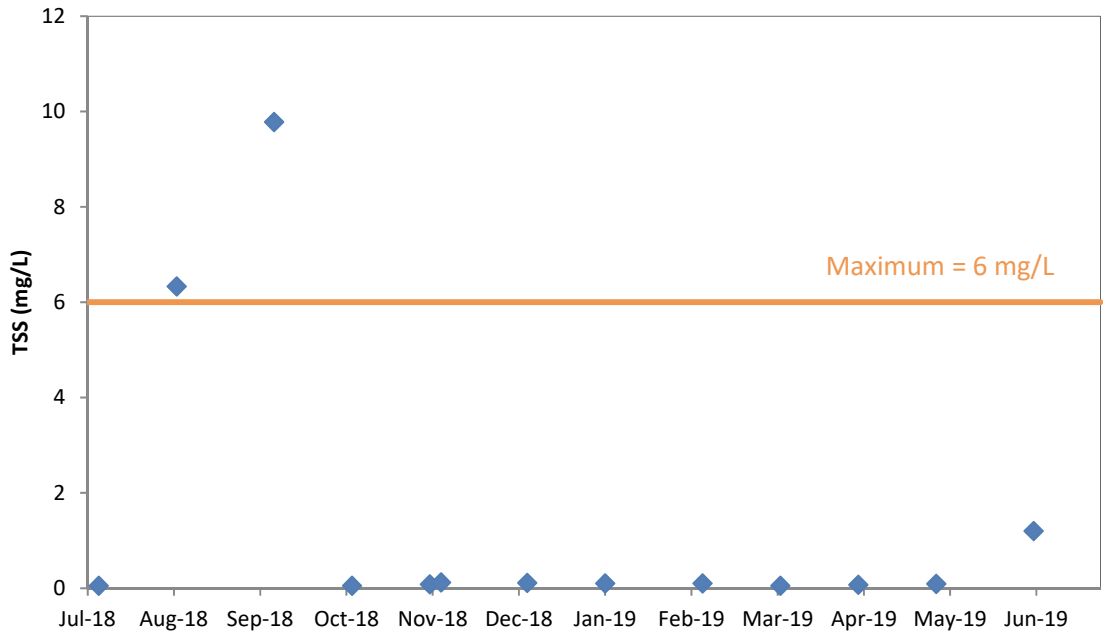
* Ammonia Maximum was exceeded twice in the 2018-19 financial year. Please refer to the next page for further details.
** Median *E. Coli* was exceeded five times in the 2018-19 financial year. Please refer to the next page for further details.
*** 80th Percentile *E. Coli* was exceeded twice in the 2018-19 financial year. Please refer to the next page for further details.

### *Exceedances*

#### AMMONIA

Maximum Ammonia was exceeded twice in the 2018-19 financial year at the Dayboro Sewage Treatment Plant. Process aerobic fraction was adjusted in response to exceedances to improve effluent ammonia. Overall 83% compliance in Ammonia maximum targets was achieved in the 2018-19 financial year.

*Figure 8 – Dayboro STP – ammonia – maximum*



## FAECAL COLIFORMS

Target Median and Maximum were exceeded at Dayboro Sewage Treatment Plant. The plant relies on sunlight to naturally disinfect the effluent prior to on-site irrigation. Hence, disinfection performance is impacted by lack of sunlight (i.e. wet weather) and algae present in the effluent storage dam (excessive algae prevents sunlight from penetrating the water column). Nu-Algi has been trialled to reduce algae in the storage dam to improve UV disinfection. Overall 62% compliance with the Faecal Coliforms median and 85% compliance with Faecal Coliforms 80th percentile limits were achieved in the 2018-19 financial year. There is no risk to the environment nor the community due to reduced disinfection performance because effluent is disposed of via on-site land irrigation. .

*Figure 9 – Dayboro STP – faecal coliform – median*

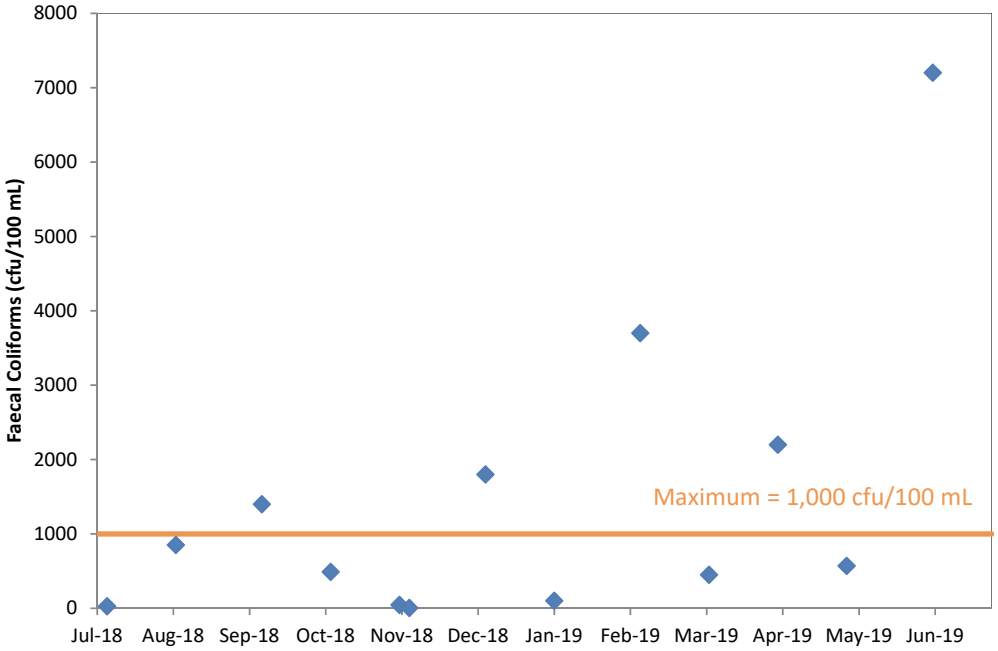
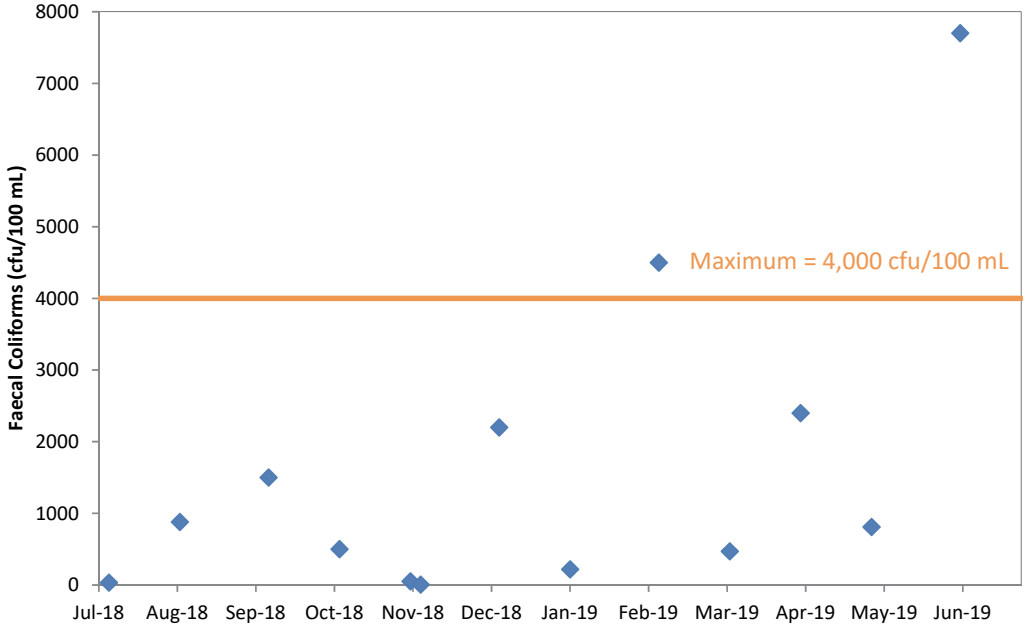



*Figure 10 – Dayboro STP – faecal coliform - maximum*



## 3.7. Kawana-Landsborough sewage treatment plants

*Table 12 – Kawana-Landsborough STP release targets^*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| $BOD_5$ | mg/L | 52 | long term 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 53 | long term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 53 | range | ✓ |
| DO | mg/L | 53 | minimum | ✓ |
| $NH_3$-N | mg/L | 53 | long term 50th percentile | ✓ |
| | | | maximum | ✓ |
| Free Chlorine Residual | mg/L | 53 | maximum | ✓ |
| Faecal Coliforms | cfu/100 mL | 53 | median | ✓ |
| | | | 80th percentile | ✓ |

^ Note that effluent to the main outfall contains flow from both Kawana and Landsborough Sewage Treatment Plants.

## 3.8 Kenilworth Sewage Treatment Plant

*Table 13 – Kenilworth STP Release Targets^*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| **$BOD_5$** | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| **TSS** | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| **pH** | pH units | 53 | range | ✗* |
| **DO** | mg/L | 53 | minimum | ✓ |
| **Faecal Coliforms** | cfu/100 mL | 53 | median | ✓ |
| | | | 80th percentile | ✓ |

^ Note that no discharge to the nearby creek was released from Kenilworth Sewage Treatment Plant (i.e. treated effluent was released to the disposal area). Thus discharge to waters limits are not assessed and therefore 100% compliance with release to waters limits was attained.

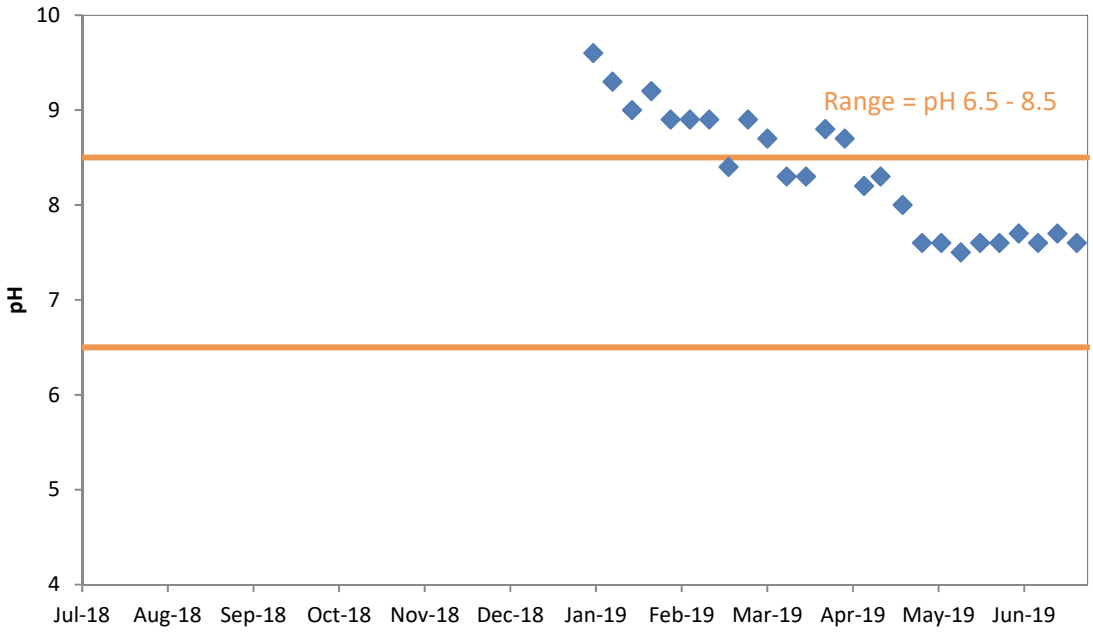
* pH limits for discharge to land were exceeded eleven times in the 2018-19 financial year. Please refer to the next page for further details.

*Non-Compliance*

pH

The pH limit was exceeded eleven times in in the 2018-19 financial year. pH compliance is a newly introduced effluent quality land discharge requirement as of 23 November 2018. pH limits were not initially met due to the impacts of algae in the facultative treatment lagoons. Unitywater's floating wetlands trial has so far demonstrated the ability to reduce pH impacts, achieving compliance. The trial is currently ongoing and Unitywater will monitor the wetland's ability to control pH in warmer months when algae activity is increased. 58% compliance for pH was attained in the 2018-2019 financial year. Although the trial is in its early stages, it appears that the floating wetland may also assist with nutrient reduction.

*Figure 11 – Kenilworth STP – pH*




## 3.9. Maleny Sewage Treatment Plant

*Table 14 – Maleny STP release targets to constructed wetlands*

| Parameter | Unit | Number of Samples ^ | Target Type | Compliant |
|---|---|---|---|---|
| TSS | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| pH | pH units | 53 | range | ✓ |
| DO | mg/L | 53 | minimum | ✓ |
| TN | mg/L | 53 | long term 50th percentile | ✓ |
| TP | mg/L | 53 | long term 50th percentile | ✓ |
| *E. Coli* | cfu/100 mL | 53 | median | ✓ |

*Table 15 – Maleny STP release targets to forest irrigation*

| Parameter | Unit | Number of Samples ^ | Limit Type | Compliant |
|---|---|---|---|---|
| pH | pH units | 53 | range | ✓ |
| Electrical Conductivity | µs/cm | 53 | maximum | ✓ |
| TN | mg/L | 53 | maximum | ✓ |
| TP | mg/L | 53 | maximum | ✓ |
| E. Coli | cfu/100 mL | 53 | median | ✓ |

^ Total number of samples of effluent. Note that effluent released to the constructed wetlands and forest irrigation is sampled from the same location, however flow is diverted to either, but not both, outfalls on any one day.

## 3.10 Maroochydore Sewage Treatment Plant

*Table 16 – Maroochydore STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| Faecal Coliforms | cfu/100 mL | 53 | median | ✓ * |
| | | | 80th percentile | ✓ * |

*Table 17 – Maroochydore STP Mass Limits*

| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| Average Annual Flow | ML/yr | 365 | maximum | ✓ |
| Nitrogen Mass Load | kg/yr | 53 | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | 53 | maximum | ✓ |

* Median faecal coliforms was exceeded five times while 80th percentile faecal coliforms was exceeded six times in the 2018-19 financial year. Please refer to the next page for further details.

*Non-Compliance*

## FAECAL COLIFORMS

Median faecal coliform was exceeded five times while 80th percentile faecal coliforms was exceeded six times at Maroochydore Sewage Treatment Plant. This was due to reactive maintenance on a secondary clarifier and UV disinfection system maintenance (level control system and disinfection lamps) activities. 91% and 89% compliance in median and 80th percentile faecal coliforms were respectively obtained in the 2018-19 financial year.

The information below is a 39% improvement over the performance of the previous financial year due to improved maintenance on the UV disinfection system.

*Figure 12 – Maroochydore STP – faecal coliforms – median*

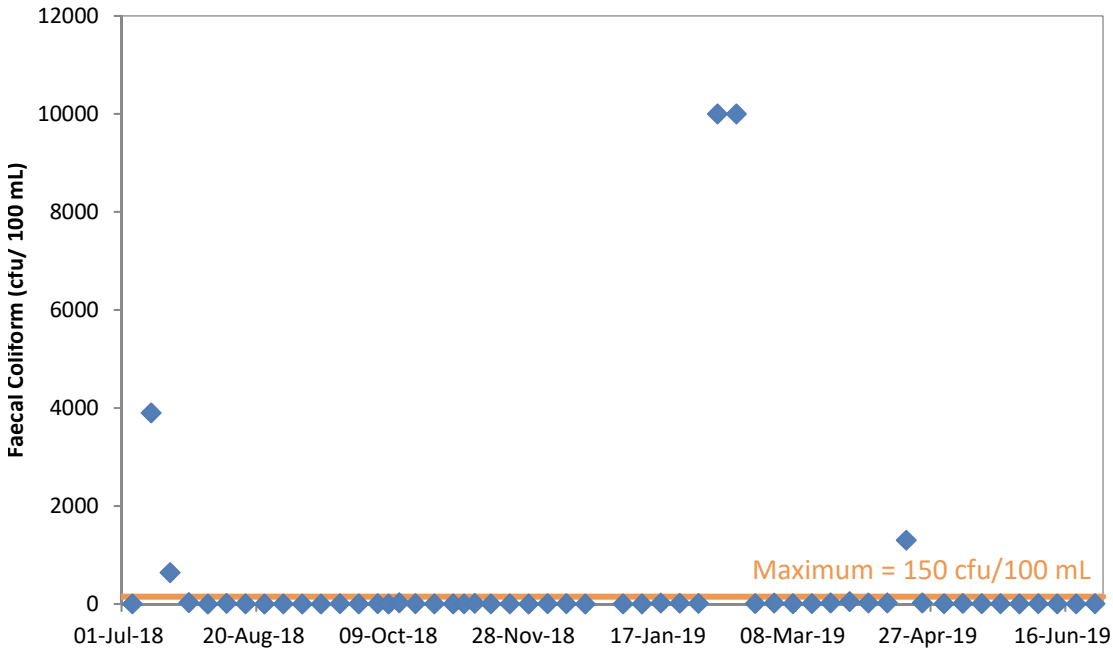
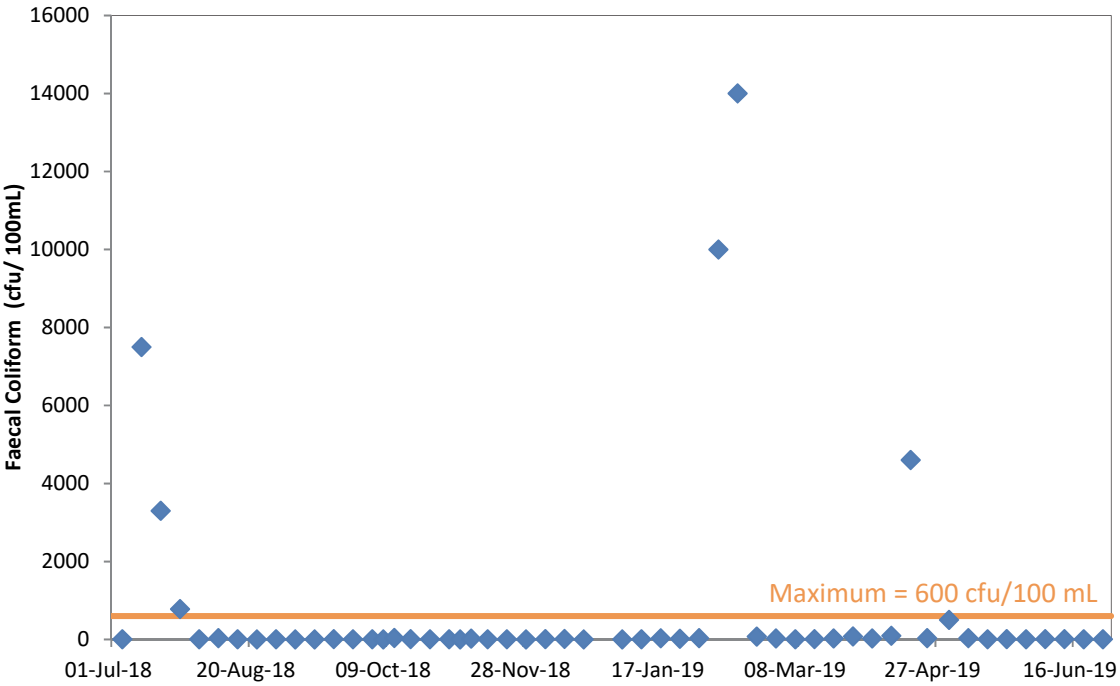


*Figure 13 – Maroochydore STP – faecal coliforms – 80th percentile*



## 3.11 Murrumba Downs Sewage Treatment Plant

*Table 18 – Murrumba Downs STP release targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| $BOD_5$ | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 53 | range | ✓ |
| DO | mg/L | 53 | minimum | ✓ |
| Ammonia Nitrogen | mg/L | 53 | maximum | ✓ |
| TN | mg/L | 53 | long term 50th percentile | ✓ |
| | | | short term 50th percentile | ✓ |
| | | | maximum | ✓ |
| TP | mg/L | 53 | long term 50th percentile | ✓ |
| | | | short term 50th percentile | ✓ |
| | | | maximum | ✓ |
| Faecal Coliforms | cfu/100 mL | 265 | median | ✓ * |
| | | | 80th percentile | ✓ * |

* Median and 80th percentile faecal coliforms were both exceeded once in the 2018-19 financial year. Please refer to the next page for further details.

*Table 19 – Murrumba Downs STP Volumetric Limits*

| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| **Dry Weather Flow** | ML/d | 268 | maximum | ✓ |
| | | | average | ✓ |
| **Volumetric Release** | ML/d | 365 | maximum on any one day | ✓ |

*Table 20 – Murrumba Downs STP Mass Limits*

| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| **$BOD_5$** | kg/yr | 53 | annual load | ✓ |
| | kg/d | | 50th percentile load | ✓ |
| **TN** | kg/yr | 53 | annual load | ✓ |
| | kg/d | | 50th percentile load | ✓ |
| **TP** | kg/yr | 53 | annual load | ✓ |
| | kg/d | | 50th percentile load | ✓ |

*Exceedances*

## FAECAL COLIFORMS

The faecal coliform exceedances were a result of a UV disinfection lamp preventative maintenance activity (lamp replacement). Overall, 98% compliance was attained for both median faecal coliforms and 80th percentile faecal coliforms in the 2018-19 financial year.

*Figure 14 – Murrumba Downs STP – faecal coliforms – median*

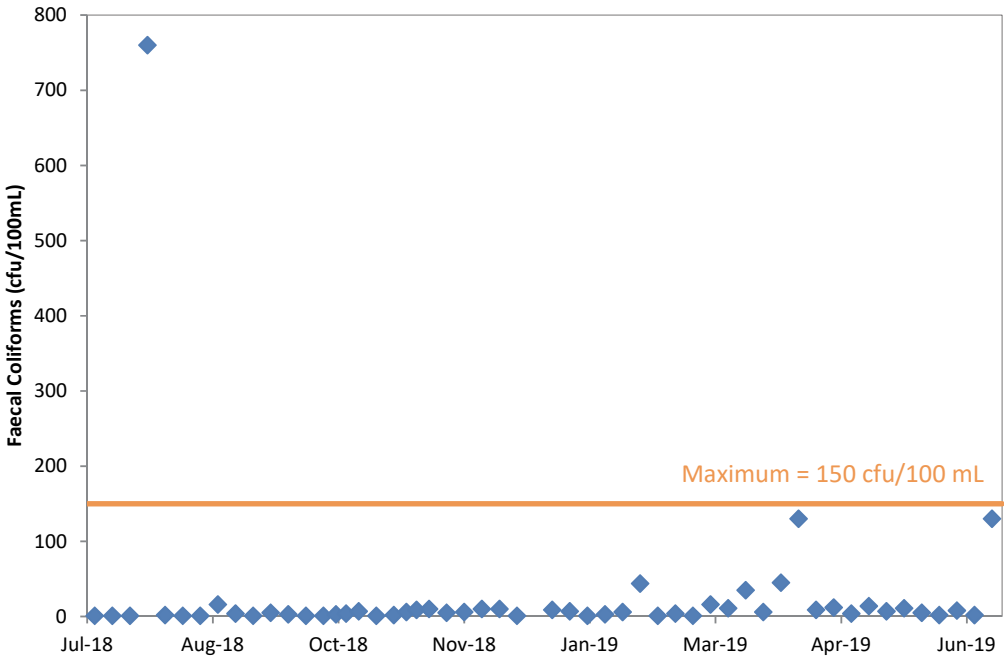
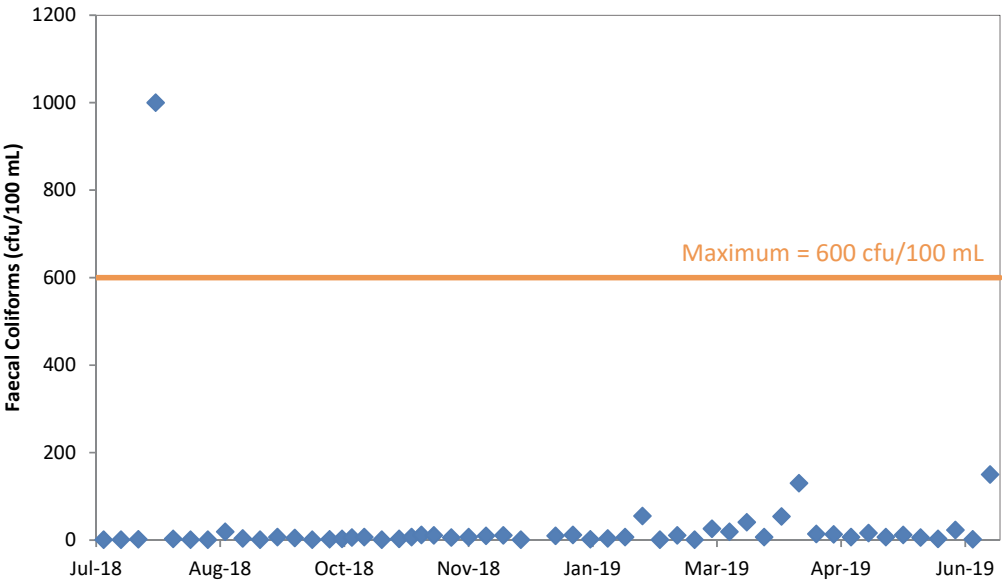



*Figure 15 – Murrumba Downs STP – faecal coliforms – 80th percentile*



## 3.12 Nambour Sewage Treatment Plant

*Table 21 – Nambour STP release targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| **TSS** | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| **pH** | pH units | 53 | range | ✓ |
| **DO** | mg/L | 53 | minimum | ✓ |
| **$NH_3$-N** | mg/L | 53 | long term 50th percentile | ✓ |
| | | | maximum | ✓ |
| **TN** | mg/L | 53 | long term 50th percentile | ✓ |
| **TP** | mg/L | 53 | long term 50th percentile | ✓ |
| **Faecal Coliforms** | cfu/100 mL | 52 | median | ✓ |
| | | | maximum | ✓ |

## 3.13 Noosa Sewage Treatment Plant

*Table 22 – Noosa STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| Faecal Coliforms | cfu/100 mL | 52 | maximum | ✓ |
| | | | maximum | ✓ |

*Table 23 – Noosa STP Mass Limits*

| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| Average Annual Flow | ML/yr | 365 | maximum | ✓ |
| Nitrogen Mass Load | kg/yr | - | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | - | maximum | ✓ |

## 3.14 Redcliffe Sewage Treatment Plant

*Table 24 – Redcliffe STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| **$BOD_5$** | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| **TSS** | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| **pH** | pH units | 53 | range | ✓ |
| **DO** | mg/L | 53 | minimum | ✓ |
| **Free Chlorine Residual** | mg/L | 53 | maximum | ✓ |
| **Faecal Coliforms** | cfu/100 mL | 265 | median | ✓ |
| | | | 80th percentile | ✓ |

*Table 25 – Redcliffe STP Mass Limits*

| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| **Average Annual Flow** | ML/yr | 365 | maximum | ✓ |
| **Nitrogen Mass Load** | kg/yr | - | maximum | ✓ |
| **Phosphorus Mass Load** | kg/yr | - | maximum | ✓ |

## 3.15 South Caboolture Sewage Treatment Plant

*Table 26 – South Caboolture STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| **$BOD_5$** | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| **TSS** | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| **pH** | pH units | 53 | range | ✓* |
| **DO** | mg/L | 53 | minimum | ✓ |
| **Free Chlorine Residual** | mg/L | 53 | maximum | ✓ |
| **Faecal Coliforms** | cfu/100 mL | 265 | median | ✓ |
| | | | 80th percentile | ✓ |

* pH was outside of the compliance range once in the 2018-19 financial year. Please refer to the next page for further details

*Table 27 – South Caboolture STP Mass Limits*

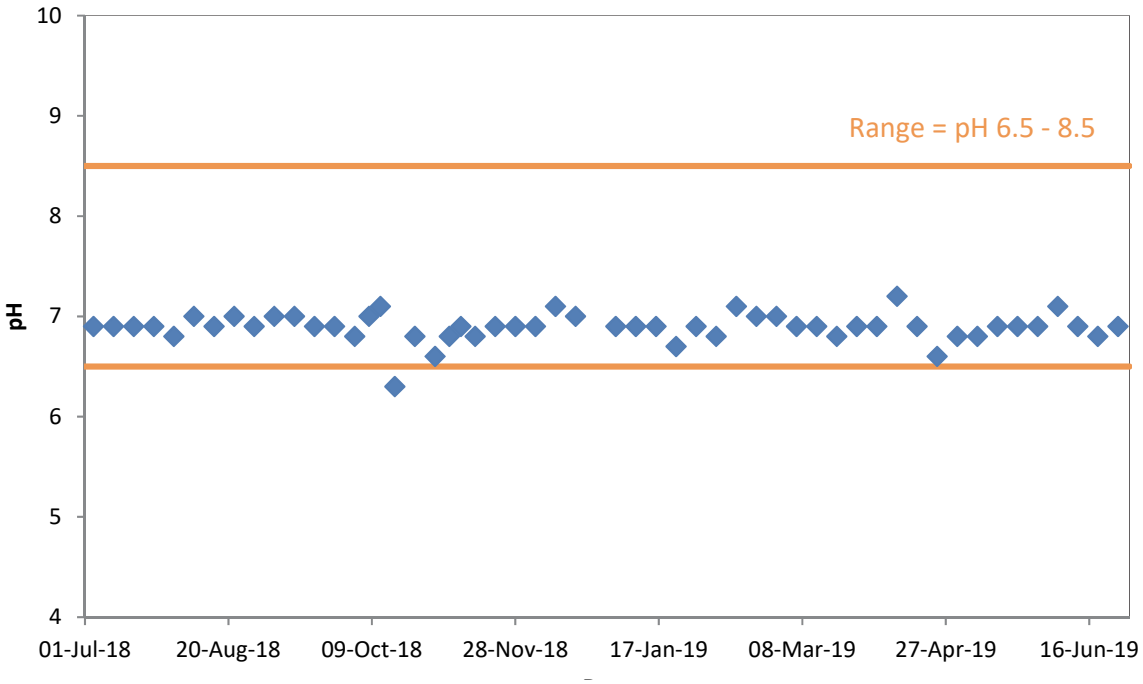
| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| **Average Annual Flow** | ML/yr | 366 | maximum | ✓ |
| **Nitrogen Mass Load** | kg/yr | - | maximum | ✓ |
| **Phosphorus Mass Load** | kg/yr | - | maximum | ✓ |

*Exceedances*

pH

pH was outside the compliance range once in the 2018-19 financial year at South Caboolture Sewage Treatment Plant. The short term excursion from compliance range was caused by aluminium sulphate dosing to reduce total phosphorus and coinciding with a wet weather event. Overall 98% compliance with pH limits was achieved in the 2018-19 financial year.

*Figure 16 – South Caboolture STP – pH*



## 3.16 Woodford Sewage Treatment Plant

*Table 28 – Woodford STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| **$BOD_5$** | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| **TSS** | mg/L | 53 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| **pH** | pH units | 53 | range | ✓ |
| **DO** | mg/L | 53 | minimum | ✓ |
| **Free Chlorine Residual** | mg/L | 53 | maximum | ✓ |
| **Faecal Coliforms** | cfu/100 mL | 265 | median | ✓ |
| | | | 80th percentile | ✓ |

*Table 29 – Woodford STP Mass Limits*

| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| **Average Annual Flow** | ML/yr | 365 | maximum | ✓ |
| **Nitrogen Mass Load** | kg/yr | - | maximum | ✓ |
| **Phosphorus Mass Load** | kg/yr | - | maximum | ✓ |

# 4. Definitions and Legend

Definitions of acronyms, units of measurement and legends throughout this performance report are defined below.

*Table 30 – Acronyms and Definitions*

| Acronym | Term | Definition |
|---|---|---|
| **$BOD_5$** | biochemical oxygen demand after 5 day test | The amount of dissolved oxygen needed by aerobic organisms to break down organic material. |
| **BNR** | biological nutrient removal | A biological process used for nitrogen and phosphorous removal from sewage. |
| **DES** | Department of Environment and Science | |
| **DO** | dissolved oxygen | Gaseous oxygen that is mixed in water and is available to aquatic organisms for respiration. |
| ***E. Coli*** | *Escherichia coli* | Used as an indicator of pathogenic organisms that may cause diseases. |
| **IDEA** | intermittent decanted extended aeration | A three stage wastewater treatment process that involves aeration, settling and decanting. |
| **$NH_3$ – N** | ammonia nitrogen | A chemical compound that is removed in order to maintain the health of waterways. High levels can cause environmental issues such as eutrophication. |
| **SBR** | sequential batch reactors | A draw-and-fill biological treatment process that uses aerobic microorganisms to break down and treat wastewater. |
| **TN** | total nitrogen | The sum of nitrate, nitrite and ammonia in water. These are removed in order to maintain the health of waterways and prevent environmental issues such as eutrophication. |
| **TP** | total phosphorus | The sum of phosphorus compounds. These are removed in order to maintain the health of waterways and prevent environmental issues such as eutrophication. |
| **TSS** | total suspended solids | Total amount of solid particles that remain suspended within the wastewater. |
| **UV** | ultraviolet | A technology using radiation that disinfects wastewater. |
| | faecal coliform | Used as an indicator of pathogenic organisms that may cause diseases. |

*Table 31 – Definition of Units*

| Units | Definition |
|---|---|
| µs/cm | micro-Siemens per centimetre |
| cfu/100 mL | colony forming units per 100 millilitre |
| kg/yr | kilogram per year |
| mg/L | milligrams per litre |
| ML | megalitres |
| ML/yr | megalitres per year |
| NTU | Nephelometric Turbidity Units |

*Table 32 – Legend*

| Symbol | Compliancy value |
|---|---|
| ✓ | > 90% |
| ✓ | 80% - 90% |
| ✗ | < 80% |

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